

Remarks:

This amendment is submitted in an earnest effort to advance this case to issue without delay. The examiner has indicated that the case contains allowable subject matter.

The specification has been amended to eliminate some minor obvious errors. A new Abstract has been supplied that complies with US Rules. No new matter whatsoever has been added.

Claim 1 has been amended to define the invention with somewhat greater particularity over the art and to overcome the formal §112 rejections.

Claim 4, which was found to contain allowable subject matter, has been amended to include the subject matter of its parent claims so that it is allowable.

Amended claim 1 and new claim 10 define a system where the position of the outer tool is detected to control its movement. This is in sharp distinction to systems where the back pressure exerted by the workpiece against the tool is detected and is particularly applicable to an apparatus for forming a relatively easily deformed can body.

US patent 4,487,048 of Frei has an inner tool 2 formed of segments 14 that cooperate with an outer tool 3 to form grooves in the workpiece 24 that extend parallel to the center axis of this workpiece 24. Thus it is absolutely essential that the inner tool 14 and outer tool 3 rotate synchronously, that is so that the ridges 3a on the outer tool 3 fit in the grooves of the inner tool 14. This is achieved here by the simple expedient of a gear transmission 9, 10. Radial movement of the tool 3 is effected by the cam 32. There is no arm and no angular-position sensor. In addition the entrainment-driving of the outer tool, as defined in new claim 10, is not seen here.

US 4,869,088 of Kadotani does not relate to an apparatus for shaping can bodies; instead it concerns the massive deformation of solid-metal rings. Thus this is nonanalogous art. The problem in Kadotani is producing a perfectly circular ring. A highly complex controller is employed for operating the servomotor 27 that positions the shaping roll 4, the servomotor 25 that drives the support roller that drives the mandrel 5, and the hydraulic cylinder for positioning the bracing rolls 41 and 42 on the outside of the workpiece ring. The mandrel 5 and ring 14 are moved synchronously. As stated in lines 34 to 37 of column 5, this system is aimed at preventing axial elongation of the workpiece. A sensor 31 monitors the inner diameter of the ring 14 as it is formed.

In this arrangement the shaping operation is ended only when the workpiece reaches its desired finish dimensions. Unlike the instant invention two separate drives 19 and 25 are provided that drive the inner and outer tools, respectively. The mandrel 5 is rolled off the inside of the workpiece, unlike in the instant invention. The sensor controls the deforming pressure via the computer 40. Thus this extremely complex system is significantly different from that of the instant invention.

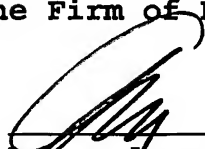
US 5,528,917 of Bajraszewski is intended for forming splines on shafts. This is, like US '088 a system for massive deformation unlike anything applied to a can body. With massive deformation the workpiece must be very accurately shaped and dimensioned to start with, or the tools will be damaged. This system is another example of nonanalogous art using pressure sensors rather than position sensors.

The instant invention is clearly allowable over the above-discussed art under §103. Notice to that effect is earnestly solicited.

If only minor problems that could be corrected by means of a telephone conference stand in the way of allowance of this

case, the examiner is invited to call the undersigned to make the necessary corrections.

Respectfully submitted,  
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Enclosure:                      Substitute Abstract  
                                    Substitute Specification  
                                    Marked copy of translation